

# Every Drop Counts



## ■ Grade Level:

Upper Elementary, Middle School

## ■ Subject Areas:

Fine Arts, Mathematics, Government, Environmental Science

## ■ Duration:

Preparation time:  
50 minutes

Activity time: One week

## ■ Setting:

Classroom and home

## ■ Skills:

Gathering information (observing, collecting, measuring); Analyzing (comparing); Applying; Evaluating

## ■ Charting the Course

Prior to this activity, students can explore the amount of available fresh water ("A Drop in the Bucket") and monitor their water use ("Water Meter"). In "Easy Street" students compare the amount of water used by a family today to a family living in the 1890s. A related activity is "Irrigation Interpretation," in which students investigate irrigation practices.

## ■ Vocabulary

conservation, xeriscaping

*How is conserving water like investing in the future?*

## ▼ Summary

Students identify and implement water conservation habits to learn how this essential resource can be shared with other water users of today and tomorrow.

## Objectives

Students will:

- determine how water conservation practices save water.
- identify water conservation habits they can change or adopt.
- recognize that water conservation is important.

## Materials

- Copies of *Water Conservation Primer* (handout)
- Copies of *Constructing a Water Flow Cup* (student worksheet)
- Large paper cups (about 32 oz [1 l]) (2 cups per group)
- Heavy tape
- Stop watch
- Pin
- $\frac{1}{16}$ -inch diameter nail

## Making Connections

The topic of resource conservation is becoming more common in schools and in other facets of our society. Television and other media often present water conservation practices. Students appreciate the need for water conservation if they or someone they know has experienced a water shortage. By participating in simple water-saving measures, students experience ways they can positively contribute to the conservation of water.

## Background

Earth has a finite amount of fresh, usable water. Fortunately, water is naturally recycled (collected, cleansed, and distributed) through the hydrologic cycle. Humans have developed the technology to speed this process. However, because of diverse factors (drought, flood, population growth, contamination, etc.) water supplies may not adequately meet a community's needs. Conservation of water can ensure that supplies of fresh water will be available for everyone, today and tomorrow.

Water conservation from a practical and philosophical standpoint makes sense. The idea of using only the amount of water necessary has universal appeal. However, conserving water involves changing habits. Since many of these habits have evolved over a lifetime, they can prove difficult to alter.

People can become active in conserving water by starting simply, then gradually taking more advanced steps to reduce water consumption. The simplest habits involve turning off water whenever it is not being used. When water is needed for rinsing dishes, it can be held in a sink rather than allowing it to flow unused down the drain. An individual may simply use less water. For example, some people use a hose to "sweep" sidewalks, when a broom works well. People can shorten their shower times or reduce the amount of water they use when bathing.

Other conservation methods may initially require more effort and funds, but in the long run will save money and resources. For example, households can install low-flow showerheads with smaller holes that reduce water flow and increase pressure. A capped bottle weighted with stones takes up space in a toilet tank, reducing the amount of water available to flush.

## Every Drop Counts

*Project WET Curriculum and Activity Guide*

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Lawn care often requires large quantities of water. Water volume can be reduced by watering in the early morning or late evening, and by watering less often and more carefully (e.g. not watering sidewalks and streets). More advanced water conservation measures could include installing drip irrigation systems and xeriscaping: landscaping with plants that require less water.

Some regions of the United States and other parts of the world do not perceive a need to conserve because water is plentiful. However, using water efficiently has economic as well as environmental benefits. Environmentally, conserving water helps ensure that ample water will be available and reduces wastewater. Economically, water saved (or not wasted) is water that does not have to be purchased. Water conservation programs can help a municipality avoid or delay building or upgrading new drinking-water or wastewater treatment plants, potentially saving millions of dollars.

## Procedure

### ▼ Warm Up

Have students list the ways they use water. Have students describe or draw pictures of situations in which they believe water is being wasted. Students can share their pictures and discuss ways that they would use this water more efficiently. Have them list ways water can be conserved or not wasted.

### ▼ The Activity

1. **Ask students to keep track of the water they use over a one-week period. They can keep journals or use “Water Meters,” page 273, to monitor use. Have students design a chart to record their water use and the number of gallons or liters used.** Do students think they used water wisely? Did they ever waste water?

2. **Discuss reasons water should not be wasted.** Students could consider future water availability, sharing a limited resource, sustaining a resource, cost-effectiveness, etc.

3. **Have students research water conservation strategies and develop a set of activities they can use to conserve water at school and home.** Their research can be supplemented with the *Water Conservation Primer* provided in this activity.

4. **Have students identify three to five water conservation habits they can individually adopt. Ask them to write these down. For the next week, they should try to practice these habits. Instruct them to record results in their charts.** Remind students that forming new habits takes time and effort.

5. **Students can participate in one or more of the *Conservation Capers* found in the side bar on the following page while implementing their water conservation strategies.**

### ▼ Wrap Up and Action

At the end of the week, ask students if their conservation practices made any difference in the amount of water used. Have students refer to their charts and compare the amounts of water used before and after conservation practices were implemented. Which practices were easy to adopt? Which were more difficult? Do they hope to adopt any other conservation habits?

Have students design posters advertising the benefits of conserving water. The posters may include a list of things people can do to save water.

## Assessment

Have students:

- list and illustrate ways water can be conserved (*Warm Up* and step 5).

- demonstrate how water-efficient products reduce the amount of water used (step 5).
- compare amounts of water used before and after water conservation strategies are implemented (*Wrap Up*).

Upon completing the activity, for further assessment have students:

- write a paragraph or develop a TV news spot that reflects their views on the importance of water conservation.

## Extensions

Students can encourage their families or the school to adopt water conservation procedures.

Visit a hardware store. Examine water conservation products. Compare the cost of the products to the amount and cost of water saved. How long would it be before the product “pays for itself”?

Contact municipalities and industries to learn how they conserve water.

Learn how government policies support water conservation practices (e.g., tax breaks). If the community lacks government support for conservation, students may want to write letters to their representatives expressing their views about conservation.



## Conservation Capers

### Conservation Caper One

Have students present a “Wasteful Water Charade.” Refer to the list of wasteful water habits generated by the class in the *Warm Up* (e.g., leaving an unattended faucet running, flushing toilets unnecessarily, using a hose to sweep the sidewalk, allowing a faucet to leak, taking long showers). Write these on slips of paper. Divide the class into groups and give each group one of the habits. Each group should create and perform a pantomime to display the behavior written on the paper. When another group identifies the habit, this second group should create a companion pantomime to demonstrate correcting the wasteful habit.

### Conservation Caper Two

Ask students if they know ways they can reduce the amount of water flowing out of their homes’ faucets. Some students may be familiar with low-flow showerheads. To simulate how low-flow showerheads function, have students make water flow cups and compare the effect of flow restrictors on water quantity. (See *Constructing a Water Flow Cup*.)

### Conservation Caper Three

Have students demonstrate the difference in amounts of water used by a toilet with a weighted water bottle in the tank (Toilet A) versus one with a full tank of water (Toilet B). For this activity, Toilet A uses three gallons (11.4 liters) of water per flush while, like most standard toilets, Toilet B uses approximately five gallons (19 liters).

Ask all students to stand in the back of the room to represent a common pool of water such as a city reservoir or ground water source. Each student represents one gallon (3.8 liters) of water. Two other students stand at either side of the room; acting like water meters, they will count the number of water students that pass by.

Indicate that the left half of the room represents a household with Toilet A and the right half represents one with Toilet B. The front of the room represents a wastewater treatment plant.

Tell students that both toilets have been flushed. Three students should move to the left and then to the front; while five move to the right, then to the front. Continue the process until all students have moved to the front.

Have students compare the number of gallons (liters) needed by each toilet. If a household was limited to a specified amount of water, which toilet would make that supply last longer? Which toilet would contribute to a higher water bill?

## Resources

🍏 Goldin, Augusta. 1983. *Water, Too Much, Too Little, Too Polluted*. San Diego, Calif.: Harcourt.

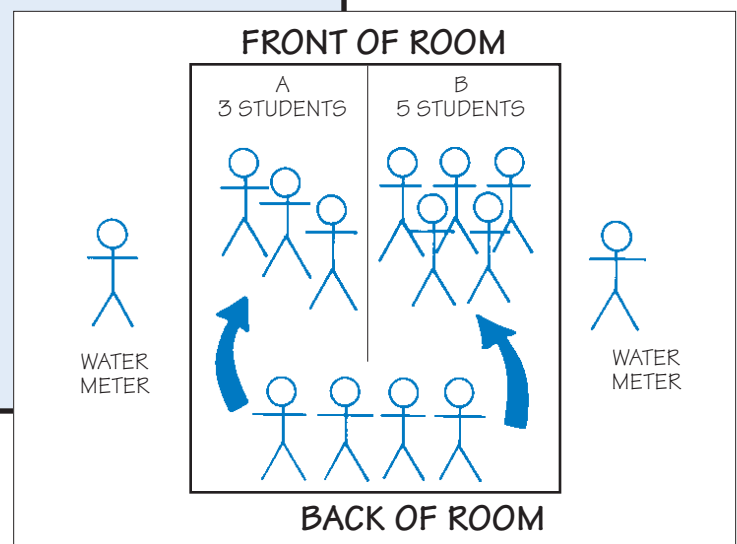
🍏 Green, Carol. 1991. *Caring for Our Water*. Hillside, N.J.: Enslow Publications, Inc.

🍏 Manner, Trudi J. 1985. *Water Resources*. New York, N.Y.: Watts.

The Montana Watercourse. 1993. *A Catalogue of Water Conservation Resources*. Bozeman, Mont: The Watercourse and National Project WET.

*Water Watchers: Water Conservation Curriculum for Junior High School Science and Social Studies Classes*. 1989. Contact: Massachusetts Water Resources Authority, Charlestown Navy Yard, 100 First Avenue, Boston, MA 02129. (617) 242-7110.

*Water Wisdom*. Contact: Massachusetts Water Resources Authority, Charlestown Navy Yard, 100 First Avenue, Boston, MA 02129. (617) 242-7110.



## Constructing a Water Flow Cup

- Using a nail, punch five holes into the bottom of a large paper cup. Using a pin, punch five holes in a second cup. The location of the holes should be the same for each cup. Cover the holes of each cup with a piece of sturdy tape.
- Fill the cup with the large holes with water.
- With a stopwatch handy, remove the tape and have another student time how long it takes for the water to pour out of the cup. Be careful not to squeeze the cup. Repeat the procedure two more times; make sure the water level is the same for each trial. Calculate the average time.
- Repeat the procedure for the second cup (timing the flow three times and calculating the average).
- Compare the flow rates of the two cups.
- What is the difference in the drainage times of the two?
- How do the streams of water from the cups compare?
- Would one cup make a better showerhead than the other?
- How could you use the flow restrictor data from this activity to help your family save water?

## Water Conservation Primer

- Turn off the water when it is not in use. Don't leave it running when brushing teeth. Turn off the water between soaps and rinses when washing hands.
- Run the dishwasher or washing machine only with a full load.
- Keep a bottle of cold drinking water in the refrigerator instead of running water until it becomes cool.
- Limit shower time to ten minutes or less.
- Take showers instead of baths. (When taking baths, limit the amount of water used.)
- Put a capped bottle of rocks or marbles in the toilet tank to reduce water use. Do not use the toilet for a trash can.
- When washing dishes by hand, use a sink full of rinse water rather than letting the water run.
- Use a broom instead of a hose to sweep sidewalks and driveways.
- When washing the car, use a hose with an on/off nozzle or use buckets of rinse water.
- Water lawns in the mornings or evenings when water will not evaporate as quickly. Make sure the water lands on vegetation and not on streets or sidewalks. If possible, save rainwater for watering lawns.
- If you need to run water before it becomes hot, store the cool running water in a bottle for future use. Unheated water can be used for rinsing dishes, and washing vegetables and hands.
- Fix leaks!
- Install a low-flow showerhead.

